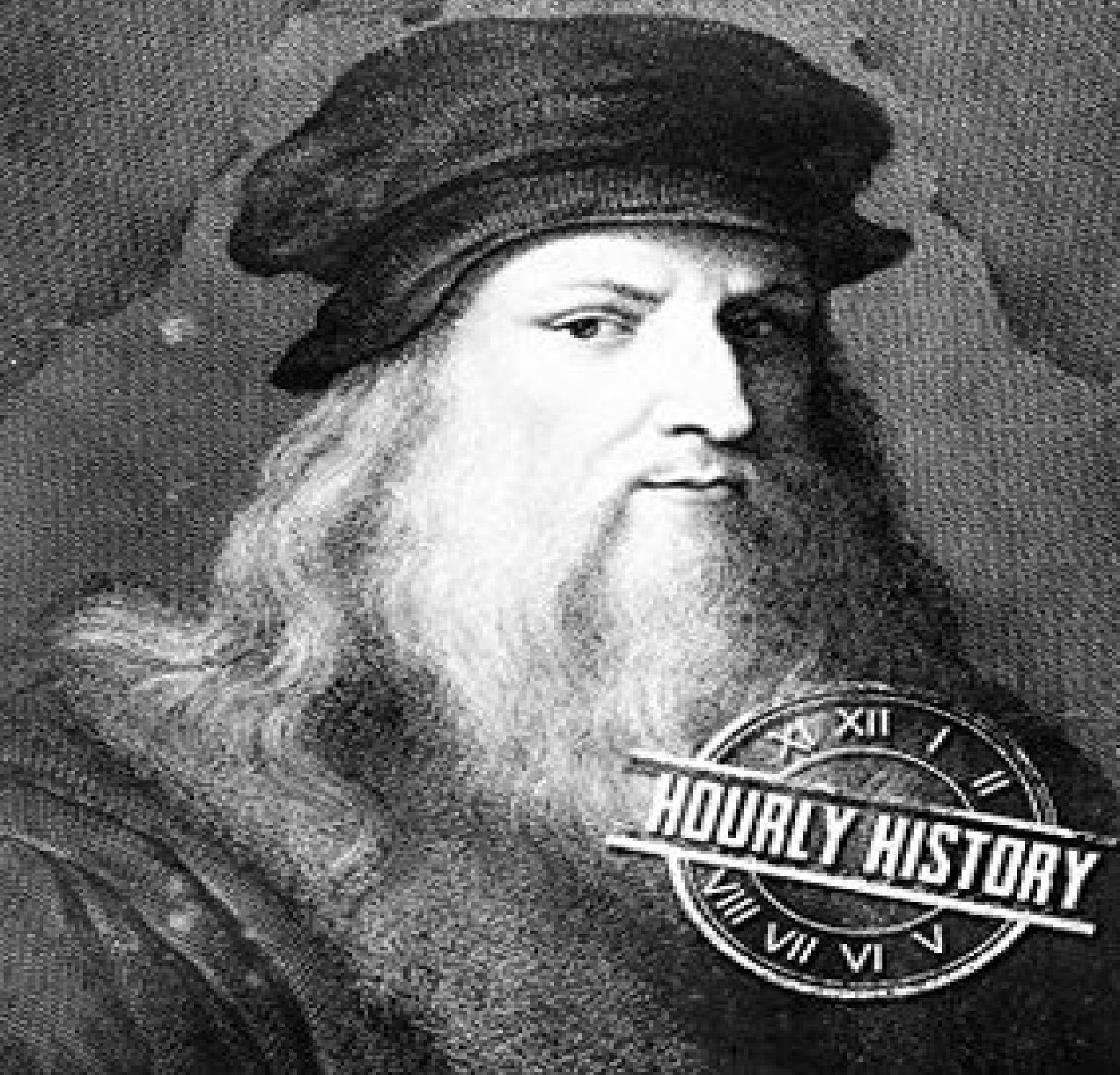


# LEONARDO DA VINCI

A LIFE FROM BEGINNING TO END



# LEONARDO DA VINCI

*A Life From Beginning to End*

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# Introduction

If I were talking to you about a man called Leonardo di ser Piero, would you know who that is? Chances are you wouldn't. But, if I said Leonardo da Vinci, you would instantly recognize his name.

Both these people are the same man. Leonardo da Vinci would grow up to become the ultimate in what we think of as a Renaissance man—in fact, he was the original. He embodied everything that was beginning to take root in Italy in the fourteenth through the sixteenth centuries, a time in history known as the Renaissance.

Leonardo seemed to be born with a curious mind and an intellect that demanded answers for every question which he posed about science, nature, painting, sculpture, architecture, inventions, military engineering, and drafting. He dabbled in all of these areas, and brilliantly, too.

Leonardo is known as one of the greatest painters who ever lived, and many argue he was the greatest artist ever. However, his genius went far beyond the easel and his paintbrushes. His mind could conceive of almost anything, from a beautiful representation of Heaven to graphical illustrations of the human body in a time when there were no such things as CAT scans or x-rays.

Leonardo's lifetime was spent observing and doing so in many different venues. His notebooks were filled with examples of what it means to be human. He looked at life from numerous perspectives and recorded all he saw.

From light and shade to perspective and visual perception, from botany and landscape to physical sciences and astronomy, from architecture and planning to sculpture and experiments, from inventing to philosophy, there was nothing that didn't touch Leonardo da Vinci.

By the time of his death, Leonardo had seemed to capture the very heart of Europe. Everyone knew who he was—and this in an age when communication was slim to none. Quite an accomplishment for someone born a bastard in a remote Italian village no one had heard of. In time, he would become the favored one of popes, princes, and kings.

He was able to capture a time in history like no other. The European Renaissance was flowering out of the previous centuries and the Middle

Ages. These new centuries, the fourteenth to the sixteenth, would not only challenge people but re-direct their thinking into ways that would introduce and recognize a more modern time. But, for that to happen, you needed extraordinary thinkers.

So, let's take a look at one of the most extraordinary thinkers of all: Leonardo da Vinci.

# Chapter One

## Early Beginnings and the Italian Renaissance

*“Learning never exhausts the mind.”*

—Leonardo da Vinci

Leonardo was born on April 15, 1452, in the Tuscan hill town of Vinci. His mother, Caterina, was a peasant girl and was not married to Leonardo’s father, Piero Fruosino di Antonio da Vinci, who was quite wealthy. Leonardo had no last name, but was known throughout the region as Leonardo di ser Piero da Vinci meaning “Leonardo, (son) of (Mes)ser Piero from Vinci.”

Modern evidence uncovered suggests that Leonardo’s mother Caterina was a slave girl brought in from the Middle East. It was common for many prominent families in early Renaissance Italy to bring in women from Eastern Europe or the Middle East. Of course, Piero was never married to Caterina, only involved romantically with her.

Little is known about Leonardo’s early life, only that he spent his first five years living in Anchiano in the home of his mother. By 1457 he then lived with his father, grandparents, and uncle in the small town of Vinci. Leonardo’s father married several times during his childhood, and Leonardo ended up with twelve half-brothers and sisters. Most of these he had little to no contact with; they were known to give him a hard time over inheritance money. Even in centuries past, some things never change.

Leonardo received an adequate education, learning basic Latin, mathematics, and geography. He was never a stellar student, instead finding his attention on things other than what were found in classrooms.

The century in which Leonardo was born was the beginning of the Italian Renaissance. The fourteenth, fifteenth, and sixteenth centuries would

become a time of great cultural upheaval and achievement in Italy as well as in all of Europe. The Black Death, which had ravaged Europe earlier in the fourteenth century, set the stage for the transition from the Middle Ages to a time of rebirth; hence the name Renaissance.

The Italian Renaissance is best known for its art and architecture as well as a new philosophy which was dawning all across the European nations at this time. Long-held beliefs about life, death, and everything in-between was now being challenged in every way. Thinkers and influencers were appearing where none had existed before.

This was a time when there were also major achievements in music, literature, and science. Italy became the leader in all of these endeavors. Italy in these days was a divided country; in fact, Italy would not unite until the nineteenth century. Instead, large areas of Italy were carved up by other European countries and used by them. The Italian Renaissance flourished in central Italy in the region known as Tuscany. This is where the city of Florence resides, and is where the rebirth began, spreading to other cities such as Venice and later, Rome.

Cultural awakenings were at the heart of the Italian Renaissance. Poetry was headed by Petrarch and Boccaccio, new architecture included St. Peter's Basilica in Rome and Florence Cathedral, and literature ranged from *The Prince* by Machiavelli to Castiglione's *The Book of the Courtier*, and these were just the beginning of the new thought that was coming to permeate all of Europe.

Nothing says Italian Renaissance better than the artists and their works. These painters and sculptors dominated the artistic scene in Italy for three centuries. Names that would gain great recognition and whose achievements echo down through the centuries to our modern day are all found here. These names include Fra Angelico, Domenico Ghirlandaio, Titian, Raphael, Botticelli, Michelangelo, and of course, Leonardo da Vinci.

Beauty, truth, religion, literature, even everyday life was being challenged in this remarkable time. What had been a disastrous time in the 1300s ushered in a more settled outlook as people were better fed and began having surplus money to spend on themselves. This, in turn, would bring on demand for more goods and services. To produce all of these, a growing class of bankers, skilled craftsmen, and a new middle class was beginning to emerge.

This was the Italy into which Leonardo da Vinci was born. Having only an education in basic reading and writing, Leonardo was taken by his father to apprentice to an artist known as Verrocchio, who had one of the finest workshops in all of Florence. Verrocchio was one of Florence's leading sculptors and painters.

Here Leonardo's training would have included learning about drafting, chemistry, metal working, leather working, plaster casting, carpentry, drawing, modeling, and painting. This would set the stage for his greatest achievements later on in his life.



## Chapter Two

# Leonardo's Personal Life

*"I wish to work miracles."*

—Leonardo da Vinci

By the time he was five years old, Leonardo had moved into his father and grandfather's home in Vinci. The town sat near Mount Albano and was a lovely place with olive trees and orchards. Leonardo's father Piero was away from home on business quite frequently, but his stepmother provided him ample affection.

Leonardo loved going on nature walks with his uncle and others; he would often sketch out what he saw or what he couldn't carry home as a specimen. Even when his father was home, the man paid little attention to Leonardo, but he did want Leonardo to stop his nature walks, as Piero felt they were a waste of the boy's time. This further drew a wedge between father and son.

Leonardo once told a story of his childhood. He recalls he was in his cradle, and a kite came to him. The kite opened his mouth with its tail and struck him several times inside his mouth. It was years later when Leonardo was observing the flight of birds that this memory came back to him. Ever after that time, Leonardo would be fascinated with flight.

Initially, Leonardo seemed to be like the other boys in Vinci. But as he got older, he felt more and more like a misfit, probably due to his illegitimacy and also because of his inquisitive nature about everything.

In 1462, Piero announced to his family that he was moving them to Florence. He had been hired by Cosimo de' Medici, the lord of Florence. Piero also believed that this move would be advantageous for Leonardo. He wanted his son to become a notary just as he was, and Leonardo was soon enrolled in school in Florence. Leonardo showed no interest in his classes.

His teachers would fail him in a subject; often he would learn what he could, then abruptly drop the class himself.

One of the things Leonardo loved to do was mirror-writing. Because he was left-handed, he would write from right to left on a page, with each letter written in reverse. He used this method throughout his life.

When not in school or wondering about his classwork, Leonardo loved Florence. He often walked far from home, exploring gardens, fountains, and all the beauties of the city. Every little thing he found, from bird eggs to insects dried on pins, he kept from his father's sight, lest the man disapprove even more.

But, Florence was one of the best things Piero could have done for his son. Florence was a huge city for its time; over 50,000 people lived there. There were over a hundred churches and over three dozen piazzas, one grander than the next. Florence was a city of craftsmen, where every type of craft from woodworking to silk making was done.

Most of all, Florence was home to some wonderful artists. There was the sculptor, Donatello, and the architect Filippo Brunelleschi, along with numerous other painters as well. Here Leonardo could poke his head inside artists' studios, marveling at all he saw and becoming ever more enamored with art.

One of the things Leonardo saw in abundance in Florence were books—which was very different than his home in Vinci. There were books everywhere on every subject. Not only did Leonardo devour books about the ancients such as Plato and Aristotle, but there were books and maps about the world and everything in it.

Piero may not have been the most attentive father, but he did recognize how his son took an avid interest in artwork. Even though paper was hard to come by and expensive, Piero made sure Leonardo had as much paper as he needed. He also believed if the boy didn't become a notary, perhaps he would make it as an artist—little did he know.

Wasn't it wonderful that Piero's employer was Cosimo de' Medici? Here was one of the wealthiest men in all of Europe, someone who loved the arts, and was a favorite in the worlds of education, art, and architecture. All over Florence, stunning pieces of art and sculpture had been created at Cosimo's behest.

But then came 1464. Two events would impact Leonardo deeply. Cosimo de' Medici died in the summer of 1464, sending the town into

mourning and confusion. His son, Piero di Cosimo de' Medici, was to take over as his successor, but there were factions trying to put him down. Eventually, he did win out and went on to rule Florence for another five years.

Also in the summer of 1464, Leonardo's stepmother Albeira died in childbirth along with the baby she had so longed to have. Albeira was like a mother to him; she had helped to raise Leonardo. Within the year, Piero remarried, but his new wife, Francesca Lanfredini, who was 16 years old, took little interest in Leonardo. In fact, he was a mere three years younger than she. Also, during this time, Leonardo's grandfather passed away.

Once Piero's father died, he now turned his full attention to his son Leonardo. Piero discovered some of Leonardo's drawings in his room and took them to his good friend Verrocchio. He immediately agreed that Leonardo was talented and wanted to have him study as an apprentice. Leonardo was ecstatic; it was a dream come true.

Apprentices in those times usually began around the age of ten; Leonardo was already going on fourteen. In exchange for lodging, food, and education, an apprentice was put on the long road to learning a craft, one which would serve him well in later years. All of Verrocchio's apprentices kept his studio clean and swept up every day. They were not allowed to paint at first; this was a process which was brought on very slowly.

Apprentices would begin by preparing canvases; this was an art in itself as it had to be done in a precise way. The paint used in the 1400s was egg-based tempera, with colors ground by hand. This was another job for the apprentices. Brushes were created out of animal hairs and stuck into wooden handles.

This type of painting gave the artist an array of different effects that could be seen all in one painting. Differences could be seen in the sheen of the paints, and an artist could use several different oils in the same painting to create the effects they desired.

When Leonardo arrived at Verrocchio's workshop, he was joined by others who were already working under the master. One of these men was Pietro Perugino, who painted the fresco known as *The Delivery of the Keys* in Rome's Sistine Chapel. The other was Sandro Botticelli, who painted *The Birth of Venus* 20 years later.

By being in the workshop all of the time, Leonardo and the other apprentices were soon learning master artist techniques. They began tracing artwork long before ever picking up a brush. Then it was on to sketchbooks and studying proportion and perspective. Apprentices also learned to sculpture. They learned how to mold clay or wax, and practiced over and over again how to draw the folds of drapery which had been made from wet rags soaked in plaster. Leonardo's closest friend at this time was Lorenzo di Credi, who was seven years younger.

Verrocchio was one of the best-known artists in all of Florence. His name, Verrocchio, meaning "true eye," certainly proved true when it came to Leonardo. Because of who he was, Verrocchio received many commissions for work all throughout Florence. One of Verrocchio's paintings is *Tobias and the Angel*. The archangel Raphael is actually a likeness of Leonardo. Leonardo even contributed to the painting with a fish held by Tobias and a fluffy dog at the angel's feet.

Another of the chores that apprentices occupied their time with was in the making of death masks. This had become a rather popular and lucrative way to make money. Verrocchio made molds of the faces of the dead using a plaster cast. Loved ones would line up at the doors to his workshop to pick up their beloved masks. Leonardo often helped to fill these orders.

In 1472, when Leonardo was 20 years old, his apprenticeship was over. He registered in the Guild of Painters in Florence. Now he too was a master painter. He could, at last, leave his unpaid days of being an apprentice behind him and accept any work that was commissioned to him. Leonardo's father set him up in his own workshop, but for the time being, the young artist continued working with Verrocchio as a paid journeyman.

Leonardo, along with Verrocchio, worked together on *The Baptism of Christ*. Leonardo painted the angel holding Jesus' robe; it was done so well that it is said Verrocchio put down his brushes and never painted again. Of course, this is probably not true but told of the awe that Verrocchio saw in his young protégé. The techniques that Leonardo used here went beyond traditional tempera, a painting medium using colored pigments mixed with a water-soluble binder (usually egg yolk). Even though tempera paintings are very long-lasting, there was a newer technique being used, called oil painting.

The following year of 1473 brought about the earliest known work of Leonardo da Vinci. It is a drawing in pen and ink of the Arno Valley.

By 1476, Leonardo and four of his friends were charged with sodomy, a crime punishable by death in Florence. The culture of the day, however, paid sodomy little attention, and Leonardo was acquitted. Who brought the charges remains a mystery, and the charges were dismissed due to a lack of evidence and witnesses. It was said that Leonardo was caught with a known prostitute, Jacopo Saltarelli. Speculation has always pointed to the Medici family coming to the aid of Leonardo. Immediately after this event, Leonardo disappeared from view for a few years. It wouldn't be until 1478 that he would be back, hard at work doing what he loved best.

Throughout his life, Leonardo never married but had a few female friends, finding companionship with the two Este sisters, Beatrice and Isabella. He even drew a portrait of Isabella while taking a trip with them once, and it was supposed to be used for a painted portrait but was lost to history.

Leonardo threw himself into his work for all of his life. His friends he kept at a distance but was always described as the most gracious and caring of people anyone could know. Beyond that, there is speculation about where his sexuality lay. Leonardo had two pupils, Salaì and Melzi, and it seems he kept most of his most intimate moments for them.

There were always those who believed some of Leonardo's paintings depicted eroticism, such as in his models of *St. John the Baptist* and *Bacchus*. Speculation ran rampant about Leonardo's sexuality when some, such as Sigmund Freud, brought it to the forefront once again. There seem to be more questions than answers.

Leonardo's assistant, Gian Giacomo Caprotti da Oreno, nicknamed Salaì, came to live in Leonardo's household in 1490. He spent lots of money on clothes, seemed to revel in gluttony, and Leonardo even accused him of stealing money and possessions. Still, for all that, Salaì remained in Leonardo's household for the next 30 years. At the time of his death in 1524, Salaì was the owner of the *Mona Lisa*.

In 1506, Leonardo took on another pupil, Count Francesco Melzi, the son of an aristocrat. It was said that Melzi was his favorite student. He traveled wherever Leonardo went and always remained with him. He would stay with Leonardo right until the master's death.

## Chapter Three

# Leonardo's Artistic Beginnings

*“I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do.”*

—Leonardo da Vinci

The Italian town of Florence was the very center of Renaissance humanism. It was here that the Renaissance came to be born, and it was one of the wealthiest cities of the time. There were prominent political families all vying for power, with the Medici family exerting the most influence of all.

Into the 1460s and 1470s, Florence was a city lacking in morals. The great families of the realm played at their entertainments, where day after day there were nothing but tournaments, parades, celebrations, and great feasting.

The traditional feast days of the Church, which had once been kept as holy, were now little reminders of piety; they had become mere excuses for parties, dances, games, horse races, floats, and fights between wild beasts. All of this required costumes, décor, stage management, and lots of people to run the shows.

It was here that some of the greatest painters and sculptors of all time were gathered. Lorenzo de' Medici was a great patron of the arts, and he was instrumental in commissioning works by Michelangelo, Botticelli, and Leonardo da Vinci. There was a great disparity of wealth in the city, with many people living poorly while others lived magnificently. It was in this world that Leonardo found himself by the age of 30. Even Verrocchio's workshop, along with many others, was employed in creating much of what went on with these daily festivities and spectacles.

Leonardo was working independently of Verrocchio by now and had received a commission for *The Adoration of the Magi*. It was at this time that Leonardo left Florence for Milan; his painting remained unfinished.

Even so, his critics have called it a masterpiece. In this unfinished painting, you see many figures standing about. Unlike previous paintings where figures stood apart from the scenes they are depicted in, here the figures seem to be interacting with one another, instead of just staring out from the canvas.

To paint *The Adoration of the Magi* , Leonardo had done numerous drawings and studies concerning perspective and classical architecture. While working on this painting, which was commissioned by the Monks of San Donato a Scopeto, Leonardo was called to Milan by Lorenzo de' Medici.

In 1482, Leonardo, who was also a very talented musician, created a silver lyre, in the shape of a horse's head. Lorenzo de' Medici sent Leonardo with the lyre as a gift to Ludovico Sforza, who was duke of Milan. While there, Leonardo informed Ludovico that he was quite knowledgeable about military engineering, hardly mentioning the fact that he was a master painter. He felt this was more the way to gain a position of some prominence in the duke's employ—he would be right.

Leonardo sketched war machines, pictures such as a war chariot with scythe blades mounted on both sides, to resemble a winged weapon; an armored tank which was propelled by two men cranking a shaft; and also a giant crossbow which required a number of men to operate. This resume of sorts certainly worked its charms, because Leonardo would come to stay in Milan for 17 years in the duke's employ.

## Chapter Four

# Early Paintings

*“I thought I was learning to live; I was only learning to die.”*

—Leonardo da Vinci

Into the 1480s, Leonardo received a number of very important commissions, all of which would prove to be ground-breaking. Leonardo was involved in so many endeavors, from painting to sculpting, sketching to experimenting, that he always ran into one problem: he often never finished what he started.

One of those unfinished paintings is entitled *St. Jerome in the Wilderness*. The painting itself, which today hangs in the Vatican Museums, is still quite fleshed out, and it is very unusual. St. Jerome, who occupies the very center of the picture, is squatting on rocks and is looking every bit the penitent he was. Jerome lived the life of a hermit in the Syrian desert. He is looking in one direction, gazing at a crucifix which is barely visible in the painting, while his other arm is pointed in the opposite direction. In his hand, Jerome holds a rock which he has been beating his chest as penance. Lying at his feet is a lion, which had become his constant companion ever since Jerome had removed a thorn from its paw.

To the left side of the panel, the background shows a distant landscape of a lake surrounded by rocky mountains that seem to be covered in mist. On the right side of the painting is what appears to be a church which was initially sketched but left undone. You can make out the church through the opening in the rocks.

*St. Jerome in the Wilderness* is a study in contrasts. Jerome is angular, and the geometrical trapezoid form is very evident in his stark figure. The figure of the lion is exactly opposite. Here you can see how anatomically correct the figure of Jerome is, a testament to all of Leonardo's sketches over time.



This painting was done during a difficult period in Leonardo's personal life. The quote at the top of this chapter, "I thought I was learning to live; I was only learning to die," was found in his diary.

Also in the 1480s, Leonardo painted *The Virgin of the Rocks*, which was commissioned in Milan for the Confraternity of the Immaculate Conception. This particular name, *The Virgin of the Rocks*, is actually of two paintings by Leonardo da Vinci. The earlier version, painted in the mid-1480s, hangs in the Louvre. The other version, painted in the mid-1490s, can be found in the National Gallery in London, England.

Both paintings are over six feet high and were painted in oils. In *The Virgin of the Rocks*, the Virgin Mary and the Child Jesus are depicted along with the infant John the Baptist. The setting is amongst the rocks, hence the name of the painting. John the Baptist is seated next to an angel who is there to protect them, and this is where his family met the Holy Family on their way to Egypt. The infant John recognizes the Christ Child as he points towards him. This painting demonstrates how beautiful the figures are as they all, including the Virgin, kneel before Jesus. Surrounding them is a landscape of wild rocks and swirling waters.

This painting was to be part of a large altarpiece, and there were two angels also painted by Leonardo, which are not evident in the main picture. These angels were both depicted with musical instruments and can be found in the National Gallery in London.

Of the many paintings Leonardo did in the 1490s, none is more famous than *The Last Supper*. This painting was commissioned for the Convent of Santa Maria delle Grazie in Milan. It was to be pictured on the back wall of the dining room.

This picture shows Jesus seated with his twelve disciples at a long table covered with a white cloth celebrating the Passover meal. Even the one who would betray him, Judas, is among them. Jesus had spoken the words, "one of you will betray me." The picture captures the moment that the disciples hear these words and their reactions to them.

*The Last Supper* took approximately three years to complete. It is one of the most masterful of Leonardo's paintings, as everyone can see the faces of the disciples and their body language as they lean in towards each other, or away from Christ. Jesus is centered in the painting, surrounded by his disciples, yet alone from all of them.

*The Last Supper* is a large painting; the work measures about 15 x 29 feet, and it is the only fresco of Leonardo's to survive over the centuries. This painting was painted with a combination of tempera and oil paints, which quickly began flaking off the wall. Within one hundred years, it seemed as if this masterpiece was completely ruined. There was a restoration soon after, but it proved to be anything but successful. Thanks to modern conservation techniques, *The Last Supper* has been stabilized. To this day, *The Last Supper* remains one of the most reproduced works of art in the world.

Also while living in Milan in 1493 and 1495, Leonardo listed a woman named Caterina, likely his mother, as one of his dependents when paying his taxes. When she died in 1495, there was a list of her funeral expenditures, which could only have been paid for by Leonardo.

Leonardo then continued to create projects for the duke of Milan, Ludovico; these included floats and pageants, as well as designs for a dome for Milan Cathedral.

Also at this time, the duke requested da Vinci to create a 16-foot tall bronze statue of his father, Francesco Sforza, seated on a horse. For about 12 years, aided by many of his students and apprentices, Leonardo worked on the statue, getting it to the point where he sculpted a life-size clay model of it. As with many of his paintings and sculptures, he would work on them for a time, then leave them off for something else. By this time, war with France was looming. Bronze was needed in the battlefields and not in the city parks, so nothing further could be done. In 1499, French forces entered Milan and shot the clay model to pieces. Subsequently, Leonardo fled the city along with the duke and the Sforza family.

## Chapter Five

# Paintings of the Sixteenth Century

*“A beautiful body perishes, but a work of art does not.”*

—Leonardo da Vinci

In 1503, Leonardo would begin work on what has come to be known as his most famous painting of all: the *Mona Lisa*. The fame of the *Mona Lisa* rests on the artfully mysterious smile on the woman’s face. Leonardo skillfully shadowed the corners of her mouth and eyes in such a way to give the impression that her smile could be many things. No one knows for sure what his intentions were, and it has been a controversy ever since.

This shadowy quality has come to be known as Leonardo’s smoke, or *sfumato*. Other artists of the day called the smile “so pleasing that it seemed divine rather than human.” The identity of the *Mona Lisa* has always been a mystery; some say it was Leonardo’s mother, while others point to Princess Isabella of Naples, and there is speculation that the portrait isn’t of a woman at all, but of da Vinci’s long-time apprentice Salaì dressed in women’s clothing. One of Leonardo’s early biographers state that the *Mona Lisa* is a picture of Lisa del Giocondo, the wife of a wealthy silk merchant in Florence.

The *Mona Lisa* is also sitting in front of a landscape which depicts the world in a state of upheaval. The coloring is subdued, and the oil paints so masterfully blended that the brushstrokes seem to disappear entirely. This painting is one of the first portraits to depict the model sitting in front of an imaginary landscape where Leonardo employed the use of aerial perspective. Aerial perspective refers to the effect the atmosphere has on the appearance of something which is seen from a distance.

Leonardo decided to place the horizon in the background at the level of the *Mona Lisa*’s eyes rather than at her neck, which was usually how portraits were done. This only adds to the mysterious nature of the painting.

Look closely and you will notice that the *Mona Lisa* has no discernible eyebrows or eyelashes. This was a custom of the time, as gentlewomen of the age considered these hairs unsightly.

The *Mona Lisa* has survived for over 500 years which is quite a testament to the artist and his work. There have been cleanings and re-workings of the painting over time, but all in all, the portrait is in a most remarkable state of preservation. Today the *Mona Lisa* is considered the most famous painting in the world. The painting was insured for over \$782 million in 2015, and if you are ever in Paris, France, be sure to visit the Louvre museum where the esteemed *Mona Lisa* resides.

If the *Mona Lisa* was commissioned by the Giocondo family, they never received it; rather the painting was a work in progress for Leonardo. He was forever tinkering with it, looking for the perfection that would never be. It has become one of France's most priceless treasures, sitting as it does behind bulletproof glass.

In another later painting, entitled *The Virgin and Child with St. Anne* commissioned in 1510, again you see the figures in the foreground and the landscape which was described as "breathtakingly beautiful" in the background. This picture is most unusual, as it depicts Mary and her mother, St. Anne, as superimposed on each other. The Virgin is leaning over her mother to pick up the Christ Child who is playing with a lamb.

This splendid painting all at once appears serene yet confusing if you look closer at it. The three figures in the painting, St. Anne, the Virgin, and the Christ Child, are all very tight within the makeup of the picture. You can clearly see the Virgin Mary playing with her son. When you look closer, you realize that the Virgin Mary is actually seated upon the lap of her mother, St. Anne. No one knows for sure what Leonardo was trying to say by doing this; there were no precedents in paintings for him or any other artist to go by. What you can readily see is that the Virgin is not as large a figure as her mother. This subtle difference in sizes was meant to emphasize the mother-daughter relationship. For an artist to depict them as he did is quite remarkable.

Mary is reaching towards the infant Jesus as he plays with a lamb. This was a precursor of what lay in store for him as a sacrificial lamb. This painting was another of Leonardo da Vinci's paintings which was copied profusely by other artists. It was a major influence on masters such as Raphael and Michelangelo.

Leonardo also painted murals. One, entitled *The Battle of Anghiari* , was commissioned in 1505 but was lost. The only one that remains of it is a copy by Peter Paul Rubens, the Flemish Baroque painter. Other contemporary painters have gone looking for this mural, even drilling holes in other murals in Florence, but not finding anything underneath. As with so many of da Vinci's works, they are lost to history.

## Chapter Six

# Scientific Studies and Anatomy

*“Weight, force and casual impulse, together with resistance, are the four external powers in which all the visible actions of mortals have their being and their end.”*

—Leonardo da Vinci

“A good painter has two chief objects to paint—man, and the intention of his soul,” so wrote Leonardo da Vinci. He went on to say that the former was easy, but the latter was hard to do because it involved gestures, expressions, and movements which were difficult to capture on canvas.

To make his paintings and portraits come more fully alive, Leonardo began keeping notes on all manner of anatomy and scientific studies. Renaissance humanism did not recognize any differences between sciences and the arts; they were all one and the same. No one would have looked at Leonardo’s engineering and science sketches and thought they were unnecessary or adding little value to their discoveries. Everything that is found in Leonardo’s notebooks can be found in his paintings, too.

When it came to seriously studying the human body, Leonardo began looking into anatomy. He dissected human and animal bodies during the 1480s. There are drawings he made of the human heart, vascular system, sex organs, bones and muscular compositions, and a fetus in utero, which are some of the first drawings on human record.

Over the years, Leonardo kept notes and drawings that amounted to over 13,000 pages. Everything he observed he would write about; his daily life was filled with observations about the natural world. Being left-handed, Leonardo wrote in mirror-image. Most of his notes were written in this way. Most likely, he did this to keep ink from running all over his hand, as being left-handed and normally writing from left to right, his hand would smear the page. Writing in reverse would prevent this.

Because Leonardo saw no divide between science and art, he viewed them with the same importance. He believed that by studying science, this would make him a better artist.

Leonardo believed that sight was the most significant sense of all and that one's eyes were the most important. He stressed how vital it was to follow *saper vedere* or “knowing how to see.” Through daily observations, one would accumulate all the knowledge one would need.

True to his word, da Vinci also studied botany, zoology, geology, physics, hydraulics, and aeronautics, the latter being remarkable as this was an age where there were no airplanes or running engines. He never left his house without a notebook or paper and pen with him. Leonardo made lists for everything—even something as commonplace as a grocery list was included. Other notes were about people who owed him money, and other designs for winged shoes, the kind that could walk on water.

He didn't leave anything out. There are sketches for future paintings, studies of faces and emotions, animals, babies, plant species, dissections, rock formations, whirlpools, flying machines, and architecture. Whenever something came along, he would sketch it or make notes about it, then file it in one of four notebooks that he kept.

Leonardo's themes included painting, architecture, mechanics, and human anatomy. His ideas were mainly theoretical, and rarely were experiments conducted based on his observations. More than anything Leonardo's sketches and drawings were of an exacting nature. No detail was too small to be included.

Take for instance the *Vitruvian Man* , one of his most famous drawings. This drawing was done sometime around 1490. It is pen and ink on paper, and shows a man in two different superimposed positions, with his arms and legs together and apart, and the figure within a circle and a square. You would know it immediately upon seeing it.

The drawing is based on the ideal human proportions that correlate with the study of geometry, described by the ancient Roman architect Vitruvius—hence the name *Vitruvian Man* . This ancient described the human figure as being the principal source of proportion within the Classical orders of architecture. These Classical orders are distinguishable by Roman columns, namely, Doric, Ionic, and Corinthian.

The ancient Romans believed that the Architectural Order of a building is the same as the key is to classical music or how grammar influences a

written composition. There was complete integration in these thought processes, and these thoughts were not lost on Leonardo da Vinci.

Leonardo's drawing of the *Vitruvian Man* perfectly parallels his understanding of proportion, an artistic measurement that he had been studying since he was a student of Verrocchio's. This famous image demonstrates how art and mathematics were perfectly blended during the years of the Renaissance. This picture is also a compilation of how man relates to nature, something which wouldn't impact the world for centuries.

Leonardo's drawing of the *Vitruvian Man* shows how he observed the ancient texts of Classical Architecture and his observations of human bodies. When drawing the circle and the square, he correctly deduces that the square cannot have the same center as the circle, so the navel is placed lower than it should be.

Leonardo's *Vitruvian Man* is used to show the symmetry of not only the human body but of the universe as a whole. The arm and leg positions create sixteen different poses. The pose of the figure with his arms out and his legs together seems to be drawn in the square, while the "spread-eagle" position is seen as drawn in the circle. All of the notes on the page are in mirror-image.

Today, Leonardo's notebooks have found their way into some of the world's most prestigious collections. Some are housed in the Royal Library at Windsor Castle in England, the Louvre, the Victoria and Albert Museum, and the Biblioteca Ambrosiana in Milan. The *Codex Leicester* and a collection of Leonardo's scientific writings are owned privately by Bill Gates, founder of Microsoft. None of Leonardo's writings were published during his lifetime, and many seemed to be prepped for just that.

In his dealings with science, Leonardo came at it from a strictly theoretical viewpoint; his observations were very detail-oriented but did not include public experiments, only small ones he attempted himself. Because Leonardo did not learn Latin well as a student, most of his scientific findings were ignored by his contemporaries.

Even so, his writings followed strict scientific methods, but a more recent study of Leonardo da Vinci puts him in a whole other category as a scientist from others such as Galileo Galilei or Isaac Newton. Leonardo's hypotheses and scientific findings integrated with the arts and, in particular, painting.



Leonardo's love of anatomy began when he was a student of Verrocchio's when he was required to learn all he could about this particular subject. Because Leonardo was such a masterful artist, he became an expert of what one could call topographic anatomy. He drew numerous sketches and studies of muscles, tendons, and bones, all anatomically correct. By the time he began dissecting human corpses, he was already a greatly established artist, and some of his most famous paintings were already done. In 1510 and 1511, he was given permission to come to the Hospital of Santa Maria Nuova in Florence and later to hospitals in Milan and Rome. From all his anatomical observations, Leonardo drafted over 240 illustrations in great detail and wrote over 13,000 words on the subject.

Leonardo loved sketching the human body. He included many studies of the skeletal system and all of its parts, including muscle and sinew. He deeply studied the mechanical functions of skeletons and how the muscles impact on their systems. This was an early precursor to modern biomechanics.

Most interestingly, as an artist, Leonardo was greatly affected by human emotion. He recorded in detail many observations concerning how human emotion affects a person's physiology. In particular, he liked looking at the effects of rage upon someone's face. He also drew many bird and animal figures, many with visible illnesses and deformities. Leonardo also dissected animals, everything from monkeys, birds, and cows to frogs, bears, and horses. He compared his findings with those of their human counterparts.

Most of his scientific findings did not include experiments, but there were times when Leonardo did extensive investigations into the worlds of anatomy and physiology. He thought he would find the sources of human emotions by dissecting corpses. He did uncover much of what is known today about muscular movement and how nerves and other body parts impact the whole.

From ancient times right into the Renaissance, there was a belief that the human body was filled with four basic substances called humors. These four humors are blood, yellow bile, black bile, and phlegm. When these are all in balance, a person is healthy. All diseases, which couldn't be explained in any other way, were the result of too much or too little in the way of the four humors.

Leonardo, in his anatomical studies, found it hard to believe in the theory of the four humors. Because of his dissections, Leonardo was able to ascertain that where these humors were said to be located were not correct. He rightly stated that the humors were not located in the heart or the liver and that the heart was the center of the circulatory system.

Leonardo da Vinci was the first scientist to define both cirrhosis of the liver and atherosclerosis. He even conducted an experiment where he created a glass aorta of the heart to observe the circulation of blood as it moved through the aortic valve. For the fluid, he used water and grass seed to watch patterns develop. All of this was far removed from his paintings, but it came from his artistic inspirations.

## Chapter Seven

# Engineering Inventions

*“I have always felt it is my destiny to build a machine that would allow man to fly.”*

—Leonardo da Vinci

As if painting, sculpting, anatomical studies, sketching, and delving into science wasn't enough for Leonardo da Vinci, he was also greatly interested in engineering and inventions. Believe it or not, Leonardo had masterful knowledge in the fields of optics, physics, hydrodynamics, mechanical engineering, civil engineering, chemistry, pyrotechnics, zoology, and geometry.

Perhaps because he knew so much about proportion and perspective, these interests naturally gave way to other more practical areas like engineering and inventing. He knew all there was to know about mechanical principles. He understood perfectly the ideas behind pulleys, cranks, gears, cantilevering, leverage, rack and pinion gears, lubrication systems, and bearings.

To go along with all of these principles, he understood all there was to know about momentum, centripetal force, and friction. For all that, his notebooks remained unpublished during his lifetime and for many years after.

Leonardo had invented many different things, and it is still impossible to know which ones passed into everyday usage. Some of his inventions did make it into daily life for some, including the automated bobbin winder, which may have been used in spinning, weaving, knitting, sewing, and lacemaking.

Two other inventions are the rolling mill and a machine which he devised to test the suppleness of wire. His invention of a lens-grinding machine was powered by a hand rotation of the grinding wheel against an

angle gear. This, in turn, rotated a geared dish where the glass or crystal to be ground would sit. By simply turning the apparatus, both surfaces were rotated at the same time.

Because Leonardo knew so much about the study of hydraulics, he was able to design machinery used on water. One of the projects he was involved in was a way to divert the Arno River in order to flood the town of Pisa, home of the famous leaning tower. Fortunately for those living there, the project was never completed. Moving on from here, Leonardo surveyed the city of Venice and created a plan for a movable dike to protect the city from invaders.

One of his incredibly far-reaching inventions was done in 1502 for Ottoman Sultan Bayezid II of Istanbul, Turkey. This project was a single span bridge, 720 feet long, intended to span an inlet at the mouth of the Bosphorus, the waterway in northwestern Turkey known as the Golden Horn. The sultan abandoned the project, believing that such a bridge was unachievable. As if to prove the sultan wrong, in 2001 a small bridge was constructed in Norway based on Leonardo's designs. His brilliance has shone through from the centuries past.

Leonardo was fascinated by all types of machines; devices that hadn't even been invented yet, but he could see in his mind as one day existing. In one of his many notebooks, there is a drawing of a vehicle which gets its propulsion from two men winding a hand crank. None of the hydraulics was ever worked out on this semi-invention, though other teams of scientists in later centuries built his machine according to Leonardo's specifications, altering the gears to make it function. Other designs by Leonardo include a cannon, which he wanted to use against invading forces, as it had the capability of hurling small stones like a large storm. Leonardo was the first inventor ever to draw a wheel-lock musket, which would appear in Europe as the flintlock musket in the mid-1500s.

When he was working in Venice, Leonardo sketched a diving suit, which he believed could be used against enemy ships. There was a recent documentary investigating his description of his diving suit, using pigskin treated with fish oil to repel water. The head of the suit had a helmet with two eyeglasses in front. A breathing stick of bamboo was attached to the back of the helmet using joints made of pigskin. This was all connected to a float of cork and wood.

When scuba divers tested the suit, they discovered it worked. This was just another example of a futuristic invention of Leonardo's which, while it looked good on paper, in his world was far too expensive to recreate. Unfortunately, many of his designs remained untested.

Leonardo was fascinated by flight all of his life. He sketched numerous birds and their wings in a desire to understand how this mechanism worked. There is a sketch he did of a flying machine which would be lifted off the ground by a man-powered rotor. This design, however, would never have worked, as the body of the flying machine rotated in the opposite direction from the rotor.

He continued to design other flying machines, some with wings that resembled large bat wings, as Leonardo believed because they would be lighter and would have an easier time lifting the flying craft. Also among his designs were a parachute and a hang glider, which would have flown if he had constructed one.

Leonardo also invented a bowed keyboard instrument, which he called the viola organista. No one had ever designed anything remotely close to this musical instrument before. It called for the use of one or more continuously rotating wheels pulling a looping bow, which worked similar to the fan belt in the engine of a modern car.

Leonardo's inventions were not only far ahead of his time intellectually speaking but also in regards to technology. He had available to him a limited range of materials with which to work. Many modern materials are much lighter in weight than anything Leonardo could have ever imagined.

## Chapter Eight

# Later Life and Death

*“Leonardo is the Hamlet of art history, whom each of us must recreate for himself.”*

—Kenneth Clark, art critic

Late in the year of 1513, Leonardo found himself living in the Vatican in Rome. Raphael and Michelangelo were also there, and like Leonardo were actively involved in artistic endeavors.

Two years later, in October 1515, King Francis I of France recaptured Milan. In December, Leonardo was present at a meeting of King Francis and Pope Leo X. The French king had commissioned Leonardo to make for him a mechanical lion which could walk forward, then open up to reveal a bouquet of lilies.

The following year, Leonardo was given a manor house called Clos Luce, not far away from the king's royal residences. Here he spent the remaining three years of his life, along with his close friend Count Francesco Melzi.

There is speculation that Leonardo had suffered a stroke in the last year before his death, and that his left hand was partially paralyzed. He had trouble standing, and relied on his companions daily. He was of old age for the early sixteenth century, and his life had been filled to the brim with all he could squeeze into it.

Towards the end of his days, Leonardo also summoned a priest to hear his last confession and to receive the Holy Eucharist. Just as he had prepared it in his will, 60 beggars followed close behind his casket, as was the custom of the time.

It was here at Clos Luce that Leonardo da Vinci died on May 2, 1519. The king had become a close friend, and it is said that Francis I held

Leonardo's head in his arms as he died. Leonardo da Vinci was 67 years old.

Of his last words on this earth, Leonardo is purported to have said: "I have offended God and mankind. My work did not reach the quality it should have."

No less true words could ever have been spoken. Count Francesco Melzi was his principal heir, and he received Leonardo's paintings, tools, library, and possessions. Leonardo's other long-time companion Salaì was bequeathed some of his vineyards. Leonardo is resting in the Chapel of Saint-Hubert in Chateau d'Amboise in France.

## Chapter Nine

# Facts about Leonardo da Vinci

*“Learn how to see. Realize that everything connects to everything else.”*

—Leonardo da Vinci

Leonardo da Vinci was quite possibly one of the greatest minds to ever walk the earth. He had an interest in so many things, and he never stopped learning. His genius did not lay in one area only; people cannot simply state that he had a masterful mind in art, architecture, engineering, or sculpting. Leonardo was a genius at all of these and many more things. Most everyone knows of his famous paintings of the *Mona Lisa* or *The Last Supper*, but there are other things he did which don't get a lot of publicity. Here are a few of those.

Leonardo da Vinci could explain why the sky is blue. People in his day and age didn't have the capabilities to explain much about science, let alone a simple question from a child. Leonardo wrote the following about the color of the atmosphere, “The blue which is seen in the atmosphere is not its own color, but it is caused by the heated moisture having evaporated into the most minute imperceptible particles, which the beams of solar rays attract and cause to seem luminous against the deep intense darkness.”

If you wear contact lenses, thank Leonardo da Vinci. His sketches suggested the optics of the human eye could be altered by placing the cornea directly in contact with water. We know it as a contact lens.

Leonardo believed the Earth is much older than what the Bible tells us. His scientific findings were some of the most complete for his time. It was the common belief of the time that the Earth was about 4,000 years old. But da Vinci used his observations to conclude that because valleys are carved by rivers, and the sea level can fall to reveal mountains, all this couldn't have happened in a mere 4,000 years.



You could call Leonardo an early pet advocate. One of his habits was to go into the marketplace, buy caged animals, bring them home, and set them free. That was his only intention. And he never forgot the less fortunate than himself either. He always welcomed his friends and gave them food—rich or poor.

Leonardo da Vinci, for all he came to know and understand in the world, was not formally educated. Being an illegitimate son, his father felt there was no need to educate him well early on. So he was mostly home schooled while living in his grandfather's house. Traditional subjects like Latin and Greek remained a mystery to him until he taught himself these things later in life.

# Conclusion

Leonardo da Vinci was like no other human on the face of the Earth. He only had human talents, yet he used these creativities to the ultimate ends of his being. Few people ever achieve a fraction of what he did.

Leonardo not only set new benchmarks in the world of painting but was a master at just about everything he touched. From music, architecture, sculpture, engineering, inventions, and his writings, Leonardo could have been hailed as so many things beyond what his artistic leanings remember him by.

Much of what we know about Leonardo da Vinci today is thanks to a little-known artist who lived in the middle of the sixteenth century, Giorgio Vasari. This man decided he could better make a difference by documenting the lives of the great Italian painters who came before him. For anyone looking for firsthand knowledge of the Italian Renaissance, there is no one better than Vasari.

Vasari was only eight years old when Leonardo died. He doesn't give you an eyewitness account, but what he does is gather accounts from people who knew the artist. From his accounts we can correctly surmise that Leonardo dreamed the impossible dream; he went to the very edges of reality at the time and reached for the stars. As Vasari has pointed out "there is something supernatural in the accumulation in one individual of so much beauty, grace, and might." Vasari looked on Leonardo da Vinci as someone who possessed every noble gift; an almost divine aura could be attributed to him, and in his later years, with his long, white, flowing beard, it was made all so much more believable.

Even up to his death, Leonardo believed he could have done more with his life—that he could have gotten more out of the hours of each day. As the years and the centuries have progressed, some of his works have crumbled or been lost, while other projects he might have started have never been finished. Too many irons in the fire all at once will do that to you.

Leonardo suffered from his own information overload—but in a good way. Because he took what he knew and always improved on it, his genius

set a standard that many today still grapple with. How could one man achieve all this? How could one mind possibly be so brilliant?

The only problem there could possibly be with Leonardo da Vinci is that most of his original work was never finished or has been lost to time. Because he worked on so much at once, he rarely completed his projects. But, what remains is enough.

Much of his success came from a culture which would rise out of the ashes of the Great Plague. Europe had been devastated by disease and death to the tune of millions of people succumbing to a plague the likes of which had never been seen before. After the plague had ravaged Europe, it was as if a great cloud was lifted, and new ways of not only doing things but of thinking were making their way across the civilized world. The spirit of the day made its way across Italy as well, where the makings of the great intellectual and scientific discoveries initially found only in monasteries and universities were unleashed into a culture willing to soak it up.

Where once artists and sculptors were restricted by what was required of them in Medieval art, now they found themselves more willing to experiment and to delve ever deeper into what made up the human psyche. There truly was a new world emerging, and it was being created by those most willing to challenge, to push the limits, to think beyond their world in the present moment.

Leonardo transformed two of the greatest artists ever to come after him. Raphael came to Florence in 1504 when he was just 21 years old because he wanted to learn all he could about anatomy and perspective from the hands of the master. Leonardo's influences could be seen in Raphael's portraits and in particular, his *Madonnas*.

Sometime around the year 1503, Michelangelo changed the way he sculpted his figures. This was due to da Vinci's influence. You can readily see the contrast in style between Michelangelo's statues of David and also of St. Matthew. The energy and emotion seen in the half-finished sculpture of St. Matthew reveals who Michelangelo was trying to copy.

It can truthfully be said that all art has been influenced by Leonardo since his time. On science and anatomy, his influences were less so, yet he was still someone whose scientific observations cannot be dismissed entirely.

Leonardo da Vinci has been called many names; the father of architecture, the father of paleontology, the world's greatest painter, a

dreamer who could conceptualize the future with his flying machines and armored vehicles. He was the true Universal Genius, also known as a polymath, someone whose talents run in all directions to the outer reaches of human intellect.

Once long ago, Leonardo is credited with saying, “You have no dominion greater or lesser than that over yourself.” No words could be truer. He lived this motto to the fullest, ever learning, ever searching, never letting a moment of his life go by to waste.

From such humble beginnings, where in his time his life would have been given no credence to be anything more than an illegitimate son, Leonardo da Vinci went on to astound them all. And he astounds us still, far away into the twenty-first century.

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